

## CLAIMS

1    1.    A magnetic head including a read head element, comprising:  
2                 a pinned magnetic layer;  
3                 a free magnetic layer having a central portion thereof having a free magnetization  
4                 therewithin;  
5                 a magnetic bias layer, including a central portion thereof that is disposed across said  
6                 central portion of said free magnetic layer;  
7                 said central portion of said bias layer being comprised of a material having an  
8                 approximately zero magnetic moment;  
9                 a barrier layer being disposed across said central portion of said bias layer.

1    2.    A magnetic head as described in claim 1 wherein said central portion of said bias layer is  
2                 comprised of an oxidized material, and said barrier layer is comprised of a material that is a  
3                 barrier to oxygen diffusion from said central portion of said bias layer.

1    3.    A magnetic head as described in claim 2, further including a thin spacer layer that is  
2                 disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer  
3                 layer and said barrier layer is deposited upon said bias layer.

1    4.    A magnetic head as described in claim 3 wherein said barrier layer is comprised of a  
2                 material that has low electrical conductivity.

1    5.    A magnetic head as described in claim 4 wherein said barrier layer is comprised of Ru or  
2                 Rh.

1       6.     A magnetic head as described in claim 5 wherein said barrier layer is comprised of Ru  
2     having a thickness of from approximately 5 Å to approximately 40 Å.

1       7.     A magnetic head as described in claim 6 wherein said barrier layer has a thickness of  
2     approximately 20 Å.

1       8.     A magnetic head as described in claim 3 wherein said thin spacer layer is comprised of a  
2     material that is a barrier to oxygen diffusion.

1       9.     A magnetic head as described in claim 8 wherein said thin spacer layer is comprised of  
2     Ru.

1       10.    A hard disk drive including a magnetic head including a read head element, comprising:  
2        a pinned magnetic layer;  
3        a free magnetic layer having a central portion thereof having a free magnetization  
4     therewithin;  
5        a magnetic bias layer, including a central portion thereof that is disposed across said  
6     central portion of said free magnetic layer;  
7        said central portion of said bias layer being comprised of a material having an  
8     approximately zero magnetic moment;  
9        a barrier layer being disposed across said central portion of said bias layer.

1    11.    A magnetic head as described in claim 10 wherein said central portion of said bias layer  
2    is comprised of an oxidized material, and said barrier layer is comprised of a material that is a  
3    barrier to oxygen diffusion from said central portion of said bias layer.

1    12.    A magnetic head as described in claim 11, further including a thin spacer layer that is  
2    disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer  
3    layer and said barrier layer is deposited upon said bias layer.

1    13.    A magnetic head as described in claim 12 wherein said barrier layer is comprised of a  
2    material that has low electrical conductivity.

1    14.    A magnetic head as described in claim 13 wherein said barrier layer is comprised of Ru  
2    or Rh.

1    15.    A magnetic head as described in claim 14 wherein said barrier layer is comprised of Ru  
2    having a thickness of from approximately 5 Å to approximately 40 Å.

1    16.    A magnetic head as described in claim 15 wherein said barrier layer has a thickness of  
2    approximately 20 Å.

1    17.    A magnetic head as described in claim 12 wherein said thin spacer layer is comprised of a  
2    material that is a barrier to oxygen diffusion.

1    18.    A magnetic head as described in claim 17 wherein said thin spacer layer is comprised of  
2    Ru.

1    19.    A method for fabricating a magnetic head, comprising:  
2        fabricating a free magnetic layer;  
3        fabricating a magnetic bias layer across said free magnetic layer;  
4        oxidizing a central portion of said bias layer;  
5        depositing an oxygen diffusion barrier layer upon said oxidized central portion of said  
6    bias layer.

1    20    A method for fabricating a magnetic head as described in claim 19 wherein said barrier  
2    layer is comprised of Ru or Rh.

1    21.    A method for fabricating a magnetic head as described in claim 20 wherein said barrier  
2    layer is comprised of Ru and has a thickness of from approximately 5 Å to approximately 40 Å.

1    22.    A method for fabricating a magnetic head as described in claim 21 wherein said barrier  
2    layer is formed with a thickness of approximately 20 Å.